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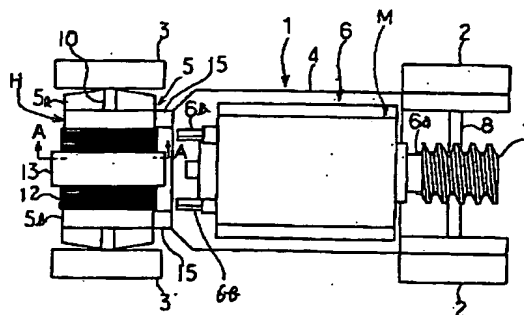
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(54)【発明の名称】 小型模型自動車

(57)【要約】

【課題】 小型かつ安価なリモコン式小型模型自動車を提供する。

【解決手段】 小型模型自動車の駆動部Mを駆動部シャーシ4に搭載したモータ6とウォーム機構とによって後輪2を駆動可能としてある。操舵部Hは操舵部シャーシ5上に搭載され、ロータ11とコイル12及びヨーク13とからなる揺動モータYによって前輪車軸10を揺動させて前輪3の方向を制御可能としてある。全体的に構成を簡単なものとしてあるため、コストの低減及び小型化を可能とし、購入容易かつ室内での遊戯に好適なものとしてある。



## 【特許請求の範囲】

【請求項1】 シャーシ上に搭載されたモータにより後輪を駆動させる駆動部と、前輪車軸を揺動させることにより操舵する操舵部とを備えており、上記操舵部には、揺動可能に設けられた上記前輪車軸にこれと一体になって揺動可能に設けられたロータと、当該ロータを駆動するコイルとからなる揺動モータが備え付けられてあり、上記コイルへの通電を制御することによって上記前輪車軸の向きを変更可能としてあることを特徴とする小型模型自動車。

【請求項2】 請求項1において、上記前輪は上記車軸に対し遊嵌しかつ軸方向に遊びが設けられていることを特徴とする小型模型自動車。

【請求項3】 請求項1または2において、上記シャーシは上記駆動部を搭載する駆動部シャーシと上記操舵部を搭載する操舵部シャーシとによって構成してあり、上記駆動部シャーシと上記操舵部シャーシとは板ばねを介して連結してあることを特徴とする小型模型自動車。

## 【発明の詳細な説明】

## 【0001】

【発明の技術分野】 本発明は、遠隔操作によって任意方向へ走行可能な小型模型自動車に関するものである。

## 【0002】

【従来の技術】 古来より乗用車やバスあるいは戦車などの乗り物を模し、走行機能を備えた模型乗り物が幼児から大人に至る広い層に愛好されている。近時の電子技術の発達はこのような模型乗り物の世界にも及んでおり、いわゆるリモコンカー等が普及していることは周知の通りである。

【0003】 模型自動車の操舵機構として、一般的にサーボモータやステッピングモータを用いるか、ばねとブランジャを組み合わせたものが知られている。

## 【0004】

【発明が解決しようとする課題】 しかしながら、模型自動車の業界にも要望されている遠隔操作式模型自動車の小型化を進めていく場合に障害となるのは駆動・操舵機構のアクチュエータであり、操舵機構ではサーボモータやステッピングモータを用いるか、ばねとブランジャを組み合わせた機構等を使用するため小型化が困難であり、また機構、制御回路等を含め複雑かつ高価なものとなっていた。

## 【0005】

【課題を解決するための手段】 上記の問題を解決するために、本発明の小型模型自動車は、電磁力によって前輪車軸を揺動させる機構を採用することによって操舵部の機構を簡素化してある。このような機構の簡素化は模型自動車の小型化を可能とし、遠隔操作式の小型模型自動車としての特質を有するものである。この操舵部は、揺動モータによって操舵されるものであり、揺動モータは揺動可能に設けられた上記前輪車軸にこれと一体にな

て揺動可能に設けられたロータと、このロータを駆動するコイルとによって構成されている。操舵はコイルへの通電をオフ、正方向、逆方向の3パターンで制御することによって揺動モータを所望の方向に揺動させることにより前輪車軸の向きを変更させるようにしてある。

【0006】 前輪は車軸に対し遊嵌しかつ軸方向に遊びを設けることによって方向変換の際の転倒防止を図ってある。また、駆動部と操舵部とを剛性の高いシャーシで一体に連結した場合には、各車輪にサスペンション機構を持たない構造では走行路面の凹凸や旋回時における各車輪に対する負荷の不均一などから前後輪4点全ての確実な接地は不可能であるが、駆動部と操舵部を柔軟な板ばねで連結した場合には、適度に車体が揺れることによって簡便な機構で走行路面が平坦でない場合にも接地状態が良好となり、旋回性及び駆動力の伝達性が向上するとともに転倒防止が図れる。

## 【0007】

【発明の実施の形態】 本発明の小型模型自動車は、シャーシ上に搭載されたモータにより後輪を駆動させる駆動部と、前輪車軸を揺動させることにより操舵する操舵部とを備えており、この操舵部には、揺動可能に設けられた前輪車軸にこれと一体になって揺動可能に設けられたロータと、このロータを駆動するコイルとからなる揺動モータが備え付けられてあり、コイルへの通電を制御することによって前輪車軸の向きを変更可能としてある。

【0008】 前輪は車軸に対し遊嵌しかつ軸方向に遊びが設けられていることが望ましい。シャーシは駆動部を搭載する駆動部シャーシと操舵部を搭載する操舵部シャーシとによって構成してあり、駆動部シャーシと操舵部シャーシとは板ばねを介して連結してあってもよい。

## 【0009】

【実施例】 図1～3は、本発明に係る小型模型自動車の全体の構成を示すもので、シャーシ1に後輪2、2及び前輪3、3が回転可能に取り付けてある。シャーシ1は後輪側に位置して後述の駆動用モータ6により後輪2を駆動させる駆動部Mと前輪側に位置して後述の前輪車軸10を揺動させることによって操舵する操舵部Hとを備えている。シャーシ1は駆動部Mを搭載する駆動部シャーシ4と操舵部Hを搭載する操舵部シャーシ5とによって構成してあり、駆動部シャーシ4と操舵部シャーシ5とは分かれている。

【0010】 駆動部シャーシ4上には、駆動用のモータ6が出力軸6aをシャーシの長手方向と一致するように搭載してある。モータ6の出力軸6aの先端部にはウォーム7が固着してある。また、後輪2、2を支持する後輪車軸8の中央部にはウォームホイール9が取り付けられてあり、ウォーム7と直交する向きで噛合している。後輪2、2は、後輪車軸8の両端に固着してあり、ウォームホイール9と後輪車軸8及び後輪2、2とは一体に回転可能としてある。したがって駆動モータ6の回転は、ウ

ォーム7、ウォームホイール9、後輪車軸8とからなるこのウォーム歯車機構を介して後輪2、2に伝達可能である。モータ6の前端部(図面左側)には、ターミナル部6b、6bが設けてあり、図示していない電池から駆動モータ6への電力を供給可能としてある。

【0011】操舵部シャーシ5は前輪車軸10に支持され、上方を開放したコ字状に形成された下シャーシ5aと、この下シャーシの解放部に蓋をするように設けてある上シャーシ5bとによって構成してある。

【0012】図4、6に示すように、下シャーシ5aの内部には、前輪車軸10を揺動させる揺動モータYを構成する円柱状のロータ11が内蔵されている。ロータ11は揺動可能に設けられた前輪車軸10にこれと一体になって揺動可能に設けられている。すなわち、ロータ11は上シャーシ5bに上端を支持され、垂直に設けられたロータ芯11aの周りを下シャーシ5aの内周部に沿って回転可能に遊嵌している。

【0013】下シャーシ5aと上シャーシ5bとによって筒状となっている部分の外周部には、揺動モータYを構成するコイル12が巻回してある。コイル12の巻回範囲は、ロータ11の投影幅よりもやや広い範囲にわたり、ロータに対する電磁力を十分に及ぼすことができるようにしてある。揺動モータYはロータ11とコイル12とからなっており、このコイルへの通電を制御することによって前輪車軸10の向きを変更可能としてある。コイル12の中央部の上面及び両側面にわたる範囲には、ヨーク13が設けてある。ヨーク13はロータ11の中央部から所定幅にわたる範囲に鞍を乗せたような状態となっている。図5に示すように、前輪3、3はホイール3aとその外周に固着されたタイヤ3bとからなり、それぞれ前輪車軸10の両端に遊嵌してある。各前輪3、3は各前輪車軸10の先端部に固着したブッシュ14によって脱落不能に支持されている。

【0014】前輪車軸10は、下シャーシ5aの両側部内に入る範囲は大径部10aとしてあり、下シャーシ5aの両側から突出する両先端部は、操舵部シャーシ5の側面に対し車軸10の段差が外側になるように配置し、段差を設けて小径部としてある。すなわち、前輪3は車軸10に対し遊嵌しかつ軸方向に遊び(間隙)Gが設けてある。

【0015】前輪ホイール3aは大径部10aと小径部10bの段差によってこれ以上内側に寄ることを阻止可能としてある。ホイール3aは前輪車軸の小径部10bの先端にブッシュ14を固着することにより前輪車軸から脱落不能としてある。前輪3の内側部は平坦面としてあり、外周部にはゴム製リングからなるタイヤ3bが堅く嵌め込んである。

【0016】ホイール3aの中心部の凹部3cとブッシュ14の外形との間及び凹部3cの底面とブッシュ14の内側面との間、ホイール3aの内径と前輪車軸の小径

部10bとの間、さらにホイール3aの内側部と大径部10aとの間には、それぞれ遊び(間隙)Gが設けてあるため、前輪3が車軸10に対し左右輪が独立して回転できるとともに、これにより、旋回時の内輪差を吸収し、旋回性を向上させる。操舵部シャーシ5の側面に対し車軸10の段差が外側になるように配置することにより、ホイール3a側面と操舵部シャーシ5側面の干渉を防ぐことができる。走行時にホイール3aに伴って車軸10が回転しないので、簡単な構造ながら直進性を保つためや旋回性を向上させるために設定されるトーイン角、接地性及び旋回性を向上させるために設けるキャンバール角等をつけることが可能である。

【0017】操舵部シャーシの下シャーシ5aの両側部は、中央の部分が外方へ張り出し、前後の部分が後退する勾配を有する緩やかな山状に形成してある。これらの山状の両側部は前輪車軸10が揺動したときに、ホイール3aの内側部がどちらかの傾斜面に当接することによってこれ以上の揺動を抑制可能とするものである。したがって、この小型模型自動車の最少回転半径は、この傾斜面の角度によって規制可能としてある(図7参照)。

【0018】図7は操舵部Hの動作を示したものである。前輪車軸10と一体のロータ11は、円周部の前輪車軸と直角な一方の位置をN極とし、これと対向する位置をS極としてある。磁気的な吸引力は磁気回路が組まれることにより大きな力が得られるのであり、単純に磁極が軟磁性材に吸引される構造では安定した無通電状態のディテント(回転止め)は得られないので、本構成ではヨーク13を介してN・S各磁極を近接させることにより磁気回路を構成し、静安定性を向上させ、直進性を高めてある。このように、コイル12は通電されていない時には、ロータ11は各磁極がヨーク13に最接近するように吸引力が働くため前輪車軸10は、各前輪3、3を直進させる方向に向かわせる状態を保持する(図5参照)。

【0019】これに対し、コイル12は通電されると、通電の方向によって異なる方向の磁界が生じ、コイル12の一方の側がN極、他方の側がS極となる。このため、ロータ11のN極はコイル12のS極に、ロータ11のS極はコイル12のN極に吸引されて、ロータ11

自体を回転させようとする力が働く。  
【0020】こうしてコイル12に通電すると、揺動モータYが揺動することにより、前輪車軸10は揺動して図7(a)に示すように前輪3、3を左向きとしたり、図7(b)に示すように右向きにしたりする。しかし、いずれの場合にも、その揺動量すなわち揺動角は下シャーシ5aの両側部の傾斜面により決まってくる。図7ではこの角度は例えば10°の範囲内に規制するようにしてある。

【0021】次に再び図1～3を用いてシャーシの連結について説明する。駆動部シャーシ4と操舵部シャーシ

5とは1対の板ばね15、15を介して連結してある。板ばね15は、所定幅の弾性を有する帯板を所定長に切断したものからなり両端部から一定長の範囲を板面上下面になるようにして各シャーシ4、5の底面に接着剤等を介して接合してある(図3参照)。駆動部シャーシ4と操舵部シャーシ5との間隔が大きい程ばねのスパンが大きくなるため、駆動部シャーシ4に対する操舵部シャーシ5の上下運動における変位置は大きくなる。また、この上下運動は板ばね15の断面二次モーメントによっても影響されるので両シャーシ間の剛性はこれらの関係から定められる。本発明では、板ばねを介在させることにより、両シャーシ4、5間の剛性を小さくして、適度に車体が揺れることによって簡便な機構で走行路面が平坦でない場合にも接地状態が良好となり、旋回性及び駆動力の伝達性が向上するとともに走行中の転倒防止が図れる。この実施例においても、小型模型自動車としてバッテリーや配線及び遠隔操作手段を備えているが、ここでは図示を省略してある。

#### 【0022】

【操作方法】既述してあるように、コイル12に無通電状態になっている時には、前輪車軸10は、直進可能状態に設定されている。本実施例としては、有線を有するリモートコントロール操作盤(リモコン、図示略)には駆動用モータ6を始動及び停止させる電気信号を出す走行スイッチと、揺動モータYを右回り方向に揺動させる電気信号を送信可能な右ハンドルスイッチ(R)と、その反対の動きをさせる左ハンドルスイッチ(L)とを備えた方向スイッチとが設けてあるものを採用してある。

【0023】走行スイッチだけを押下すると、駆動用モータ6が始動してこの模型自動車は直進し、スイッチをオフにするとモータ停止により走行を停止する。また、方向スイッチは、各ハンドルスイッチを押下している間だけ揺動モータの電流の流れる方向を規制し、前輪車軸10を右または左方向へ一定角度(10°)範囲で向きを変えた状態を維持させる。このため、模型自動車の走行中にこのスイッチのいずれかをオンにすると、一定の回転半径で走行を続けることになる。これらの方向スイッチをオフにするとその時の向きのまま直進に転ずる。したがって模型自動車はこれらの走行スイッチと方向スイッチとを操作することによって容易に所望の位置に到着するように操作することが可能である。

【0024】なお、リモコン操作盤については模型自動車の性能に合わせて各種の遠隔操作が可能なものとしてできる。高級なものではこのリモコン操作盤に代えてラジオコントロール操作盤(ラジコン)とし、模型自動車の速度を調整したり、バックさせたりするようにすることも可能である。また、赤外線信号を有するリモコンを使用しても良いことは言うまでもない。

【0025】本発明に係る模型自動車は簡素な構成とし

であるため、小型化かつ低価格化を実現している。さらに室内でも遊べるようにしてあるため、幼児向け玩具として好適なものとなる。因みにこの実施例における模型自動車の寸法は全長3cm程度のものとしてある。

#### 【0026】

【発明の効果】本発明によれば、簡略な構成となっているため、小形で安価な小型模型自動車を提供可能となる。これは容易に入手可能かつ室内でも遊べる小型模型自動車として重宝されることが期待できる。

【0027】また、前輪は車軸に対して遊嵌しかつ軸方向に遊びが設けてあるようにすれば、旋回時の内輪差を吸収し、旋回性を向上させることができるとともに、走行時にホイールに伴って車軸が回転しないので、簡単な構造ながら直進性を保つためや旋回性を向上させるために設定されるトーイン角、接地性及び旋回性を向上させるために設けるキャンバー角等をつけることが可能である。

【0028】なお、駆動部シャーシと操舵部シャーシとを板ばねで連結するようにすれば、適度に車体が揺れることによって簡便な機構で走行路面が平坦でない場合にも接地状態が良好となり旋回性及び駆動力の伝達性が向上するとともに走行中の転倒防止が図れる。

#### 【図面の簡単な説明】

【図1】本発明の構成を示す平面図である。

【図2】図1の側面図である。

【図3】同、底面図である。

【図4】図1のA-A線断面図である。

【図5】駆動部シャーシと前輪車軸と前輪との関係を示す拡大断面図である。

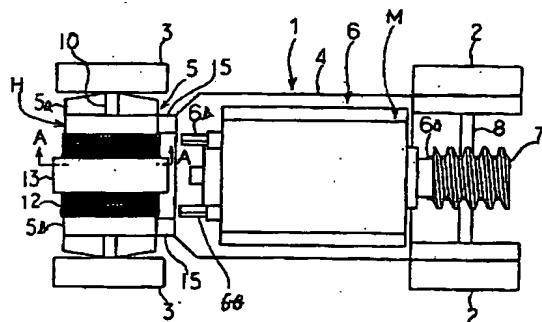
【図6】操舵部の動作を示す説明図であり、コイルに通電されていない時の状態を示す断面図である。

【図7】操舵部の動作を示す説明図であり、(a)は前輪が左向きになっている状態、(b)は前輪が右向きになっている状態を示す。

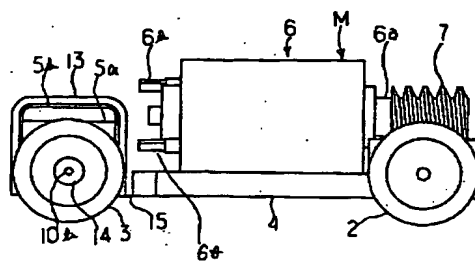
#### 【符号の説明】

M	駆動部
G	遊び
H	操舵部
Y	揺動モータ
1	シャーシ
2	後輪
3	前輪
4	駆動部シャーシ
5	操舵部シャーシ
6	モータ
10	前輪車軸
11	ロータ
12	コイル
15	板ばね

【図1】

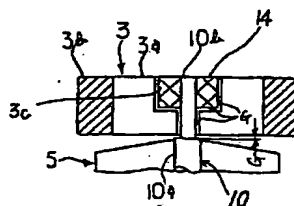
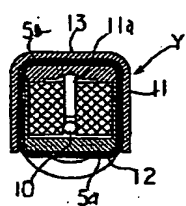


【図2】

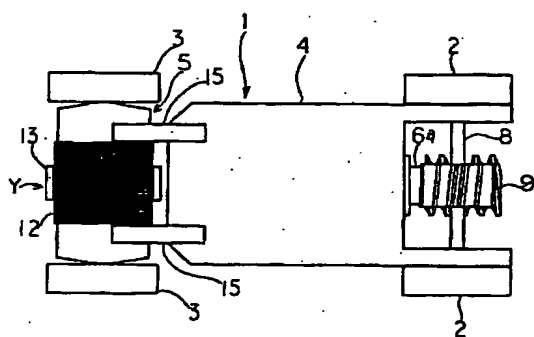


【図4】

【図5】

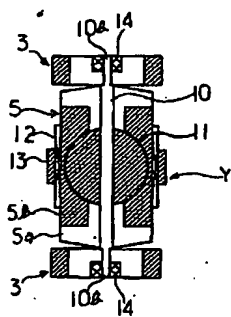


【図3】



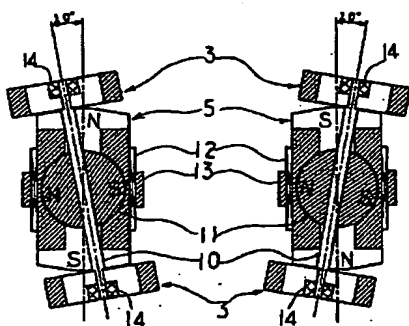
【図6】

【図7】



(a)

(b)



# PATENT ABSTRACTS OF JAPAN

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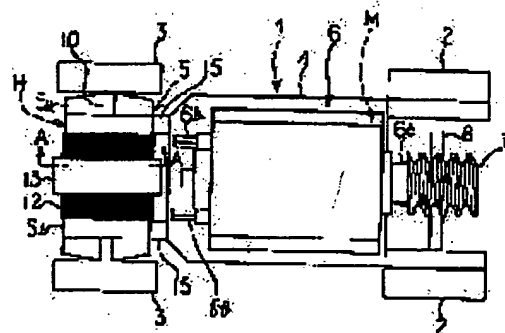
(72)Inventor : ITO AKIHIRO  
YANAGISAWA SHIGERU

## (54) SMALL MODEL AUTOMOBILE

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a small, inexpensive, remotely-controllable model automobile.

**SOLUTION:** The driving part M of a small model automobile is designed to be able to drive rear wheels 2 by means of a motor 6 and a worm mechanism which are mounted in a driving-part chassis 4. A steering part H is mounted on a steering-part chassis 5 and designed to be capable of controlling the direction of front wheels 3 by rolling a front-wheel axle 10 by means of a rolling motor comprising a rotor 11, a coil 12, and a yoke 13. Because the model automobile is structurally simplified as a whole, cost reduction and miniaturization are made possible, and the model automobile is easy to purchase and suited as a toy for use indoors.



## LEGAL STATUS

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[Date of final disposal for application]

[Patent number]


[Date of registration]

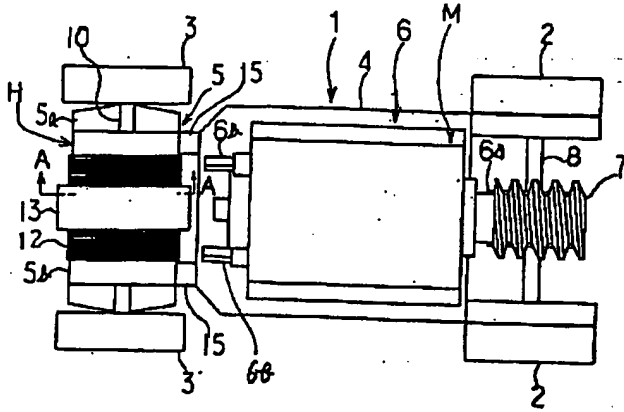
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Drawing selection [Representative drawing] 



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**CLAIMS**

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**[Claim(s)]**

[Claim 1] The small model automobile characterized by having enabled change of the sense of the above-mentioned front-wheel axle by having equipped with the swing motor characterized by providing the following, and controlling the energization to the above-mentioned coil. The mechanical component which makes a rear wheel drive by the motor carried on the chassis. Rota established in the above-mentioned front-wheel axle which is equipped with the steering section steered by making a front-wheel axle rock, and was prepared in the above-mentioned steering section at the rockable at the rockable united with this. The coil which drives the Rota concerned.

[Claim 2] It is the small model automobile characterized by for the above-mentioned front wheel fitting in loosely to the above-mentioned axle in a claim 1, and having prepared play in shaft orientations.

[Claim 3] It is the small model automobile characterized by for the mechanical-component chassis in which the above-mentioned chassis carries the above-mentioned mechanical component in claims 1 or 2, and the steering section chassis in which the above-mentioned steering section is carried constituting, and having connected the above-mentioned mechanical-component chassis and the above-mentioned steering section chassis through flat spring.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Field of the Invention] this invention relates to the small model automobile it can run in the arbitrary direction by remote operation.

[0002]

[Description of the Prior Art] Vehicles, such as a passenger car, and a bus or a tank, are imitated more from ancient times, and it is loved by the laity with the model vehicle equipped with the run function from a small child to [layer] an adult. Development of the latest electronic technology has also reached the world of such a model vehicle, and it is well known that the so-called remote control car etc. has spread.

[0003] What generally combined the spring and the plunger, using a servo motor and a stepping motor as a steering gear style of a model automobile is known.

[0004]

[Problem(s) to be Solved by the Invention] However, when the miniaturization of the remote-operation formula model automobile currently requested also from the industry of a model automobile was advanced, the actuator of a drive and a steering gear style became an obstacle, and at steering gear guard, in order to use the mechanism which combined the spring and the plunger, using a servo motor and a stepping motor, a miniaturization is difficult and became complicated and expensive including the mechanism, the control circuit, etc.

[0005]

[Means for Solving the Problem] In order to solve the above-mentioned problem, the small model automobile of this invention has simplified the mechanism of the steering section by adopting the mechanism in which a front-wheel axle is made to rock with electromagnetic force. The simplification of such a mechanism enables the miniaturization of a model automobile, and has a special feature as a small model automobile of a remote-operation formula. This steering section is steered by the swing motor and the swing motor is constituted by Rota established in the above-mentioned front-wheel axle prepared in the rockable at the rockable united with this, and the coil which drives this Rota. It is made for steering to make the sense of a front-wheel axle have changed by making a swing motor rock towards desired by controlling the energization to a coil by three patterns of OFF, the right direction, and an opposite direction.

[0006] The front wheel has aimed at fall prevention in the case of directional change by fitting in loosely to an axle and preparing play in shaft orientations. Moreover, with the structure which does not have a suspension mechanism in each wheel, when a mechanical component and the steering section are connected with one with a rigid high chassis, although all positive groundings are impossible four order rings from the irregularity of a run road surface, the unevenness of a load to each wheel at the time of revolution, etc. Fall prevention can be aimed at, while a grounding state becomes good by the simple mechanism when a run road surface is not flat and turnability and the transferability of driving force improve, when a mechanical component and the steering section are connected by flexible flat spring, and the body gets twisted moderately.

[0007]

[Embodiments of the Invention] The small model automobile of this invention is equipped with the mechanical component which makes a rear wheel drive by the motor carried on the chassis, and the steering section steered by making a front-wheel axle rock. In this steering section The front-wheel axle prepared in the rockable is equipped with the swing motor which consists of Rota established in the rockable united with this, and a coil which drives this Rota, and change of the sense of a front-wheel axle is enabled by controlling the energization to a coil.

[0008] As for a front wheel, it is desirable to fit in loosely to an axle and to have prepared play in shaft orientations. The mechanical-component chassis in which a mechanical component is carried, and the steering section chassis in

which the steering section is carried constitute the chassis, and the mechanical-component chassis and the steering section chassis may be connected through flat spring.

[0009]

[Example] Drawing 1 -3 show the composition of the whole small model automobile concerning this invention, and they have attached it in the chassis 1 possible [ rotation of rear wheels 2 and 2 and front wheels 3 and 3 ]. The chassis 1 is equipped with the steering section H steered by being located in a mechanical-component [ which it is located / mechanical component / in a rear wheel side and makes a rear wheel 2 drive by the below-mentioned motor 6 for a drive ] M, and front-wheel side, and making the below-mentioned front-wheel axle 10 rock. The mechanical-component chassis 4 in which a mechanical component M is carried, and the steering section chassis 5 in which the steering section H is carried constitute the chassis 1, and the mechanical-component chassis 4 and the steering section chassis 5 are divided.

[0010] On the mechanical-component chassis 4, the motor 6 for a drive is carried so that it may be in agreement with the longitudinal direction of a chassis in output-shaft 6a. Worm 7 is fixed to the point of output-shaft 6a of a motor 6. Moreover, the worm gear 9 is attached in the center section of the rear wheel axle 8 which supports rear wheels 2 and 2, and it has geared with the sense which intersects perpendicularly with a worm 7. It has fixed to the ends of the rear wheel axle 8, and rear wheels 2 and 2 are made possible [ the rotation to one ] for a worm gear 9, the rear wheel axle 8, and rear wheels 2 and 2. Therefore, rotation of a drive motor 6 can be transmitted to rear wheels 2 and 2 through the worm wheel mechanism of a bird clapper from a worm 7, a worm wheel 9, and the rear wheel axle 8. The terminal sections 6b and 6b are formed in the front end section (drawing left-hand side) of a motor 6, and supply of the power from the cell which is not illustrated to a drive motor 6 is enabled.

[0011] The steering section chassis 5 is supported by the front-wheel axle 10, and lower chassis 5a formed in the shape of [ which opened the upper part wide ] a KO character, and upper chassis 5b provided so that the release section of this lower chassis may be covered constitute it.

[0012] As shown in drawing 4 and 6, Rota 11 of the shape of a pillar which constitutes swing-motor Y which makes the front-wheel axle 10 rock is built in the interior of lower chassis 5a. Rota 11 is established in the front-wheel axle 10 prepared in the rockable at the rockable united with this. That is, Rota 11 has fitted in loosely the surroundings of Rota heart 11a which the upper limit was supported by upper chassis 5b, and was perpendicularly prepared in it possible [ rotation ] along with the inner circumference section of lower chassis 5a.

[0013] The coil 12 which constitutes swing-motor Y is wound around the periphery section of the portion which serves as tubed by lower chassis 5a and upper chassis 5b. The winding range of a coil 12 is crossed to mist or the latus range from the projection width of face of Rota 11, and enables it to fully have done the electromagnetic force to Rota.

Swing-motor Y consists of Rota 11 and a coil 12, and change of the sense of the front-wheel axle 10 of it is enabled by controlling the energization to this coil. The yoke 13 is formed in the range covering the upper surface and the both-sides side of a center section of a coil 12. As a yoke 13 is shown in . drawing 5 which is in the state where the saddle was put on the range ranging from the center section to predetermined width of face of Rota 11, front wheels 3 and 3 consist of wheel 3a and tire 3b which fixed on the periphery, and it has fitted loosely into the ends of the front-wheel axle 10, respectively. Each front wheels 3 and 3 are supported by the bush 14 which fixed to the point of each front-wheel axle 10 at defluxion impotentia.

[0014] Both the points that have set to major-diameter section 10a the range in which the front-wheel axle 10 goes into the both-sides circles of lower chassis 5a, and project from the both sides of lower chassis 5a are arranged so that the level difference of an axle 10 may become outside to the side of the steering section chassis 5, they prepare a level difference, and have made it the minor diameter section. That is, a front wheel 3 fits in loosely to an axle 10, and it plays to shaft orientations (gap), and G is prepared.

[0015] The prevention of front-wheel wheel 3a is enabled [ coming together inside more than this with the level difference of major-diameter section 10a and minor diameter section 10b, and ]. Wheel 3a is made impossible [ defluxion ] from the front-wheel axle by fixing a bush 14 at the nose of cam of minor diameter section 10b of a front-wheel axle. The inside section of a front wheel 3 is made into the flat side, and tire 3b which consists of a ring made of rubber is firmly inserted in the periphery section.

[0016] Between crevice 3c of the core of wheel 3a, and the appearances of a bush 14, and between the base of crevice 3c, and the medial surfaces of a bush 14, Between the bore of wheel 3a, and minor diameter section 10b of a front-wheel axle, further between the inside section of wheel 3a, and major-diameter section 10a Since it plays, respectively (gap) and G is prepared, while a right-and-left ring can rotate independently to an axle 10, thereby, a front wheel 3 absorbs the inner-ring-of-spiral-wound-gasket difference at the time of revolution, and raises turnability. By arranging so that the level difference of an axle 10 may become outside to the side of the steering section chassis 5, interference

of the wheel 3a side and the steering section chassis 5 side can be prevented. It is possible to attach the camber angle prepared in order to raise the Toin angle, road-hugging, and turnability which are set up in order to maintain rectilinear-propagation nature with easy structure and to raise turnability, since an axle 10 does not rotate in connection with wheel 3a at the time of a run.

[0017] A central portion juts out the both-sides section of lower chassis 5a of a steering section chassis to the method of outside, and it is formed in the shape of [ which has the inclination to which the portion of order retreats / loose ] a mountain. The both-sides section of the shape of these mountain enables the suppression of rocking beyond this, when the front-wheel axle 10 rocks, and the inside section of wheel 3a contacts one of inclined planes. Therefore, regulation of the minimum radius of gyration of this small model automobile is enabled with the angle of this inclined plane (refer to drawing 7 ).

[0018] Drawing 7 shows operation of the steering section H. Rota 11 of the front-wheel axle 10 and one has made the south pole the front-wheel axle of the periphery section, and the position where a position is made into N pole and while it is right-angled counters with this. Since the detent in the state by which the magnetic suction force was stabilized with the structure where the big force is acquired by constructing a magnetic circuit, and a magnetic pole is simply attracted by soft-magnetism material where it does not energize (rotation stop) is not obtained, with this composition, by making N-S each magnetic pole approach through a yoke 13, it constitutes a magnetic circuit, raises static stability nature, and has raised rectilinear-propagation nature. Thus, in order that a suction force may commit Rota 11 so that each magnetic pole may carry out a closest approach to a yoke 13 when the coil 12 is not energized, the front-wheel axle 10 holds the state of making it going in the direction which makes each front wheels 3 and 3 going straight on (refer to drawing 5 ).

[0019] On the other hand, if a coil 12 is energized, the magnetic field of the direction which changes with directions of energization will arise, and an N pole and another side side will serve as [ one coil 12 side ] the south pole. For this reason, N pole in Rota 11 is attracted by the south pole of a coil 12, the south pole of Rota 11 is attracted on the N pole of a coil 12, and the force in which it rotates Rota 11 the very thing works.

[0020] In this way, as it rocks and is shown in drawing 7 (a), front wheels 3 and 3 will be made into facing the left, or if it energizes in a coil 12, when swing-motor Y rocks, the front-wheel axle 10 will be carried out rightward, as shown in drawing 7 (b). However, in any case, the amount of rocking, i.e., a rocking angle, is decided by the inclined plane of the both-sides section of lower chassis 5a. In drawing 7 , this angle is regulated within the limits of 10 degrees.

[0021] Next, connection of a chassis is again explained using drawing 1 -3. The mechanical-component chassis 4 and the steering section chassis 5 are connected through one pair of flat spring 15 and 15. Flat spring 15 is joined to the base of each chassis 4 and 5 through adhesives etc., as it consists of what cut the strip which has the elasticity of predetermined width of face to predetermined length and a plate surface turns into a vertical side from both ends in the range of fixed length (refer to drawing 3 ). Since the span of a spring becomes large so that the interval of the mechanical-component chassis 4 and the steering section chassis 5 is large, the amount of displacement in the vertical motion of the steering section chassis 5 to the mechanical-component chassis 4 becomes large. Moreover, since this vertical motion is influenced also by the second moment of area of flat spring 15, the rigidity between both chassis is defined from these relations. In this invention, by making flat spring intervene, rigidity between both the chassis 4 and 5 is made small, and when the body gets twisted moderately, while a grounding state becomes good by the simple mechanism when a run road surface is not flat and turnability and the transferability of driving force improve, fall prevention under run can be aimed at. Also in this example, although it has the dc-battery, and wiring and a remote-operation means as a small model automobile, illustration is omitted here.

[0022]  
[Operating instruction] As mentioned already, when it is in the state where it does not energize in the coil 12, the front-wheel axle 10 is set as the state which can be gone straight on. That in which the run switch which takes out the electrical signal which makes the remote control control panel (remote control, illustration abbreviation) which has a cable put into operation and suspend the motor 6 for a drive as this example, the right-hand drive switch (R) which can transmit the electrical signal which makes swing-motor Y rock in the direction of right-handed rotation, and the direction switch equipped with the left-hand drive switch (L) to which the opposite movement is carried out have been formed has been adopted.

[0023] If the depression only of the run switch is carried out, the motor 6 for a drive will start, and this model automobile goes straight on, and if a switch is turned OFF, it will suspend a run by motor halt. Moreover, a direction switch regulates the direction where the current of a swing motor flows, only while pushing each handle switch, and it maintains the state where the sense was changed for the front-wheel axle 10 in the fixed angle (10 degrees) range the right or leftward. For this reason, when either of this switch is turned ON during a run of a model automobile, a run

will be continued with a fixed radius of gyration. If these direction switches are turned OFF, it will change to rectilinear propagation with the sense at that time. Therefore, by operating these run switches and direction switches, a model automobile can be operated so that it may arrive at a desired position easily.

[0024] In addition, about a remote control control panel, it can consider as the thing in which various kinds of remote operation is possible according to the performance of a model automobile. In a high-class thing, it is also possible to replace with this remote control control panel, and for it to consider as a radio control control panel (radio control), and to adjust the speed of a model automobile, or for it to be made to back, and to be [ it is sufficient and ] made to carry out. Moreover, it cannot be overemphasized that the remote control which has an infrared signal may be used.

[0025] Since the model automobile concerning this invention is considered as simple composition, it has realized miniaturization and low-pricing. In order to enable it to have played also indoors furthermore, it will become suitable as a toy for small children. Incidentally the size of the model automobile in this example is made into the thing with an overall length of about 3cm.

[0026]  
[Effect of the Invention] According to this invention, since it has simple composition, offer of a small and cheap small model automobile is attained. This can expect easily available and finding it useful as a small model automobile with which it can play also indoors.

[0027] Moreover, it is possible to attach the camber angle prepared in order to raise the Toin angle, road-hugging, and turnability which are set up in order to maintain rectilinear-propagation nature with easy structure and to raise turnability, since an axle does not rotate in connection with a wheel at the time of a run while a front wheel can absorb the inner-ring-of-spiral-wound-gasket difference at the time of revolution and can raise turnability, if it fits in loosely to an axle and play is prepared in shaft orientations.

[0028] In addition, while a grounding state will become good by the simple mechanism when a run road surface is not flat and turnability and the transferability of driving force will improve when the body gets twisted moderately if a mechanical-component chassis and a steering section chassis are connected by flat spring, fall prevention under run can be aimed at.

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**TECHNICAL FIELD**

---

[Field of the Invention] this invention relates to the small model automobile it can run in the arbitrary direction by remote operation.

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**PRIOR ART**

---

[Description of the Prior Art] Vehicles, such as a passenger car, and a bus or a tank, are imitated more from ancient times, and it is loved by the large layer with the model vehicle equipped with the run function from a small child to [ layer ] an adult. Development of the latest electronic technology has also reached the world of such a model vehicle, and it is well known that the so-called remote control car etc. has spread.

[0003] What generally combined the spring and the plunger, using a servo motor and a stepping motor as a steering gear style of a model automobile is known.

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**EFFECT OF THE INVENTION**

---

[Effect of the Invention] According to this invention, since it has simple composition, offer of a small and cheap small model automobile is attained. This can expect easily available and finding it useful as a small model automobile with which it can play also indoors.

[0027] Moreover, a front wheel is while being able to absorb the inner-ring-of-spiral-wound-gasket difference at the time of revolution and being able to raise turnability, if it fits in loosely to an axle and play is prepared in shaft orientations. It is possible to attach the camber angle prepared in order to raise the Toin angle, road-hugging, and turnability which are set up in order to maintain rectilinear-propagation nature with easy structure and to raise turnability, since an axle does not rotate in connection with a wheel at the time of a run.

[0028] In addition, while a grounding state will become good by the simple mechanism when a run road surface is not flat and turnability and the transferability of driving force will improve when the body gets twisted moderately if a mechanical-component chassis and a steering section chassis are connected by flat spring, fall prevention under run can be aimed at.

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**TECHNICAL PROBLEM**

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[Problem(s) to be Solved by the Invention] However, when the miniaturization of the remote-operation formula model automobile currently requested also from the industry of a model automobile was advanced, the actuator of a drive and a steering gear style became an obstacle, and at steering gear guard, in order to use the mechanism which combined the spring and the plunger, using a servo motor and a stepping motor, a miniaturization is difficult and became complicated and expensive including the mechanism, the control circuit, etc.

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**MEANS**

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[Means for Solving the Problem] In order to solve the above-mentioned problem, the small model automobile of this invention has simplified the mechanism of the steering section by adopting the mechanism in which a front-wheel axle is made to rock with electromagnetic force. The simplification of such a mechanism enables the miniaturization of a model automobile, and has a special feature as a small model automobile of a remote-operation formula. This steering section is steered by the swing motor and the swing motor is constituted by Rota established in the above-mentioned front-wheel axle prepared in the rockable at the rockable united with this, and the coil which drives this Rota. It is made for steering to make the sense of a front-wheel axle have changed by making a swing motor rock towards desired by controlling the energization to a coil by three patterns of OFF, the right direction, and an opposite direction.

[0006] The front wheel has aimed at fall prevention in the case of directional change by fitting in loosely to an axle and preparing play in shaft orientations. Moreover, with the structure which does not have a suspension mechanism in each wheel, when a mechanical component and the steering section are connected with one with a rigid high chassis, although all positive groundings are impossible four order rings from the irregularity of a run road surface, the unevenness of a load to each wheel at the time of revolution, etc. Fall prevention can be aimed at, while a grounding state becomes good by the simple mechanism when a run road surface is not flat and turnability and the transferability of driving force improve, when a mechanical component and the steering section are connected by flexible flat spring, and the body gets twisted moderately.

[0007]

[Embodiments of the Invention] The small model automobile of this invention is equipped with the mechanical component which makes a rear wheel drive by the motor carried on the chassis, and the steering section steered by making a front-wheel axle rock. In this steering section The front-wheel axle prepared in the rockable is equipped with the swing motor which consists of Rota established in the rockable united with this, and a coil which drives this Rota, and change of the sense of a front-wheel axle is enabled by controlling the energization to a coil.

[0008] As for a front wheel, it is desirable to fit in loosely to an axle and to have prepared play in shaft orientations. The mechanical-component chassis in which a mechanical component is carried, and the steering section chassis in which the steering section is carried constitute the chassis, and the mechanical-component chassis and the steering section chassis may be connected through flat spring.

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**EXAMPLE**


---

[Example] Drawing 1 -3 show the composition of the whole small model automobile concerning this invention, and they have attached it in the chassis 1 possible [ rotation of rear wheels 2 and 2 and front wheels 3 and 3 ]. The chassis 1 is equipped with the steering section H steered by being located in a mechanical-component [ which it is located / mechanical component / in a rear wheel side and makes a rear wheel 2 drive by the below-mentioned motor 6 for a drive ] M, and front-wheel side, and making the below-mentioned front-wheel axle 10 rock. The mechanical-component chassis 4 in which a mechanical component M is carried, and the steering section chassis 5 in which the steering section H is carried constitute the chassis 1, and the mechanical-component chassis 4 and the steering section chassis 5 are divided.

[0010] On the mechanical-component chassis 4, the motor 6 for a drive is carried so that it may be in agreement with the longitudinal direction of a chassis in output-shaft 6a. Worm 7 is fixed to the point of output-shaft 6a of a motor 6. Moreover, the worm gear 9 is attached in the center section of the rear wheel axle 8 which supports rear wheels 2 and 2, and it has geared with the sense which intersects perpendicularly with a worm 7. It has fixed to the ends of the rear wheel axle 8, and rear wheels 2 and 2 are made possible [ the rotation to one ] for a worm gear 9, the rear wheel axle 8, and rear wheels 2 and 2. Therefore, rotation of a drive motor 6 can be transmitted to rear wheels 2 and 2 through the worm wheel mechanism of a bird clapper from a worm 7, a worm wheel 9, and the rear wheel axle 8. The terminal sections 6b and 6b are formed in the front end section (drawing left-hand side) of a motor 6, and supply of the power from the cell which is not illustrated to a drive motor 6 is enabled.

[0011] The steering section chassis 5 is supported by the front-wheel axle 10, and lower chassis 5a formed in the shape of [ which opened the upper part wide ] a KO character, and upper chassis 5b provided so that the release section of this lower chassis may be covered constitute it.

[0012] As shown in drawing 4 and 6, Rota 11 of the shape of a pillar which constitutes swing-motor Y which makes the front-wheel axle 10 rock is built in the interior of lower chassis 5a. Rota 11 is established in the front-wheel axle 10 prepared in the rockable at the rockable united with this. That is, Rota 11 has fitted in loosely the surroundings of Rota heart 11a which the upper limit was supported by upper chassis 5b, and was perpendicularly prepared in it possible [ rotation ] along with the inner circumference section of lower chassis 5a.

[0013] The coil 12 which constitutes swing-motor Y is wound around the periphery section of the portion which serves as tubed by lower chassis 5a and upper chassis 5b. The winding range of a coil 12 is crossed to mist or the latus range from the projection width of face of Rota 11, and enables it to fully have done the electromagnetic force to Rota. Swing-motor Y consists of Rota 11 and a coil 12, and change of the sense of the front-wheel axle 10 of it is enabled by controlling the energization to this coil. The yoke 13 is formed in the range covering the upper surface and the both-sides side of a center section of a coil 12. As a yoke 13 is shown in drawing 5 which is in the state where the saddle was put on the range ranging from the center section to predetermined width of face of Rota 11, front wheels 3 and 3 consist of wheel 3a and tire 3b which fixed on the periphery, and it has fitted loosely into the ends of the front-wheel axle 10, respectively. Each front wheels 3 and 3 are supported by the bush 14 which fixed to the point of each front-wheel axle 10 at defluxion impotentia.

[0014] Both the points that have set to major-diameter section 10a the range in which the front-wheel axle 10 goes into the both-sides circles of lower chassis 5a, and project from the both sides of lower chassis 5a are arranged so that the level difference of an axle 10 may become outside to the side of the steering section chassis 5, they prepare a level difference, and have made it the minor diameter section. That is, a front wheel 3 fits in loosely to an axle 10, and it plays to shaft orientations (gap), and G is prepared.

[0015] The prevention of front-wheel wheel 3a is enabled [ coming together inside more than this with the level difference of major-diameter section 10a and minor diameter section 10b, and ]. Wheel 3a is made impossible

[ defluxion ] from the front-wheel axle by fixing a bush 14 at the nose of cam or minor diameter section 10b of a front-wheel axle. The inside section of a front wheel 3 is made into the flat side, and tire 3b which consists of a ring made of rubber is firmly inserted in the periphery section.

[0016] Between crevice 3c of the core of wheel 3a, and the appearances of a bush 14, and between the base of crevice 3c, and the medial surfaces of a bush 14, Between the bore of wheel 3a, and minor diameter section 10b of a front-wheel axle, further between the inside section of wheel 3a, and major-diameter section 10a Since it plays, respectively (gap) and G is prepared, while a right-and-left ring can rotate independently to an axle 10, thereby, a front wheel 3 absorbs the inner-ring-of-spiral-wound-gasket difference at the time of revolution, and raises turnability. By arranging so that the level difference of an axle 10 may become outside to the side of the steering section chassis 5, interference of the wheel 3a side and the steering section chassis 5 side can be prevented. It is possible to attach the camber angle prepared in order to raise the Toin angle, road-hugging, and turnability which are set up in order to maintain rectilinear-propagation nature with easy structure and to raise turnability, since an axle 10 does not rotate in connection with wheel 3a at the time of a run.

[0017] A central portion juts out the both-sides section of lower chassis 5a of a steering section chassis to the method of outside, and it is formed in the shape of [ which has the inclination to which the portion of order retreats / loose ] a mountain. The both-sides section of the shape of these mountain enables the suppression of rocking beyond this, when the front-wheel axle 10 rocks, and the inside section of wheel 3a contacts one of inclined planes. Therefore, regulation of the minimum radius of gyration of this small model automobile is enabled with the angle of this inclined plane (refer to drawing 7 ).

[0018] Drawing 7 shows operation of the steering section H. Rota 11 of the front-wheel axle 10 and one has made the south pole the front-wheel axle of the periphery section, and the position where a position is made into N pole and while it is right-angled counters with this. Since the detent in the state by which the magnetic suction force was stabilized with the structure where the big force is acquired by constructing a magnetic circuit, and a magnetic pole is simply attracted by soft-magnetism material where it does not energize (rotation stop) is not obtained, with this composition, by making N-S each magnetic pole approach through a yoke 13, it constitutes a magnetic circuit, raises static stability nature, and has raised rectilinear-propagation nature. Thus, in order that a suction force may commit Rota 11 so that each magnetic pole may carry out a closest approach to a yoke 13 when the coil 12 is not energized, the front-wheel axle 10 holds the state of making it going in the direction which makes each front wheels 3 and 3 going straight on (refer to drawing 5 ).

[0019] On the other hand, if a coil 12 is energized, the magnetic field of the direction which changes with directions of energization will arise, and an N pole and another side side will serve as [ one coil 12 side ] the south pole. For this reason, N pole in Rota 11 is attracted by the south pole of a coil 12, the south pole of Rota 11 is attracted on the N pole of a coil 12, and the force in which it rotates Rota 11 the very thing works.

[0020] In this way, as it rocks and is shown in drawing 7 (a), front wheels 3 and 3 will be made into facing the left, or if it energizes in a coil 12, when swing-motor Y rocks, the front-wheel axle 10 will be carried out rightward, as shown in drawing 7 (b). However, in any case, the amount of rocking, i.e., a rocking angle, is decided by the inclined plane of the both-sides section of lower chassis 5a. In drawing 7 , this angle is regulated within the limits of 10 degrees.

[0021] Next, connection of a chassis is again explained using drawing 1 -3. The mechanical-component chassis 4 and the steering section chassis 5 are connected through one pair of flat spring 15 and 15. Flat spring 15 is joined to the base of each chassis 4 and 5 through adhesives etc., as it consists of what cut the strip which has the elasticity of predetermined width of face to predetermined length and a plate surface turns into a vertical side from both ends in the range of fixed length (refer to drawing 3 ). Since the span of a spring becomes large so that the interval of the mechanical-component chassis 4 and the steering section chassis 5 is large, the amount of displacement in the vertical motion of the steering section chassis 5 to the mechanical-component chassis 4 becomes large. Moreover, since this vertical motion is influenced also by the second moment of area of flat spring 15, the rigidity between both chassis is defined from these relations. In this invention, by making flat spring intervene, rigidity between both the chassis 4 and 5 is made small, and when the body gets twisted moderately, while a grounding state becomes good by the simple mechanism when a run road surface is not flat and turnability and the transferability of driving force improve, fall prevention under run can be aimed at. Also in this example, although it has the dc-battery, and wiring and a remote-operation means as a small model automobile, illustration is omitted here.

[0022]

[Operating instruction] As mentioned already, when it is in the state where it does not energize in the coil 12, the front-wheel axle 10 is set as the state which can be gone straight on. That in which the run switch which takes out the electrical signal which makes the remote control control panel (remote control, illustration abbreviation) which has a

cable put into operation and suspend the motor 6 for a drive as this example, the right-hand drive switch (R) which can transmit the electrical signal which makes swing-motor Y rock in the direction of right-handed rotation, and the direction switch equipped with the left-hand drive switch (L) to which the opposite movement is carried out have been formed has been adopted.

[0023] If the depression only of the run switch is carried out, the motor 6 for a drive will start, and this model automobile goes straight on, and if a switch is turned OFF, it will suspend a run by motor halt. Moreover, a direction switch regulates the direction where the current of a swing motor flows, only while pushing each handle switch, and it maintains the state where the sense was changed for the front-wheel axle 10 in the fixed angle (10 degrees) range the right or leftward. For this reason, when either of this switch is turned ON during a run of a model automobile, a run will be continued with a fixed radius of gyration. If these direction switches are turned OFF, it will change to rectilinear propagation with the sense at that time. Therefore, by operating these run switches and direction switches, a model automobile can be operated so that it may arrive at a desired position easily.

[0024] In addition, about a remote control control panel, it can consider as the thing in which various kinds of remote operation is possible according to the performance of a model automobile. In a high-class thing, it is also possible to replace with this remote control control panel, and for it to consider as a radio control control panel (radio control), and to adjust the speed of a model automobile, or for it to be made to back, and to be [ it is sufficient and ] made to carry out. Moreover, it cannot be overemphasized that the remote control which has an infrared signal may be used.

[0025] Since the model automobile concerning this invention is considered as simple composition, it has realized miniaturization and low-pricing. In order to enable it to have played also indoors furthermore, it will become suitable as a toy for small children. Incidentally the size of the model automobile in this example is made into the thing with an overall length of about 3cm.

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[Translation done.]

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the plan showing the composition of this invention.

[Drawing 2] It is the side elevation of drawing 1 .

[Drawing 3] It is a \*\*\*\* bottom plan view.

[Drawing 4] It is the A-A line cross section of drawing 1 .

[Drawing 5] It is the expanded sectional view showing the relation between a mechanical-component chassis, a front-wheel axle, and a front wheel.

[Drawing 6] It is explanatory drawing showing operation of the steering section, and is the cross section showing a state when not energized by the coil.

[Drawing 7] It is explanatory drawing showing operation of the steering section, and, as for (a), a front wheel shows the state where it has become rightward, as for the state where the front wheel has become leftward, and (b).

[Description of Notations]

M Mechanical component

G Play

H Steering section

Y Swing motor

1 Chassis

2 Rear Wheel

3 Front Wheel

4 Mechanical-Component Chassis

5 Steering Section Chassis

6 Motor

10 Front-Wheel Axle

11 Rota

12 Coil

15 Flat Spring

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[Translation done.]

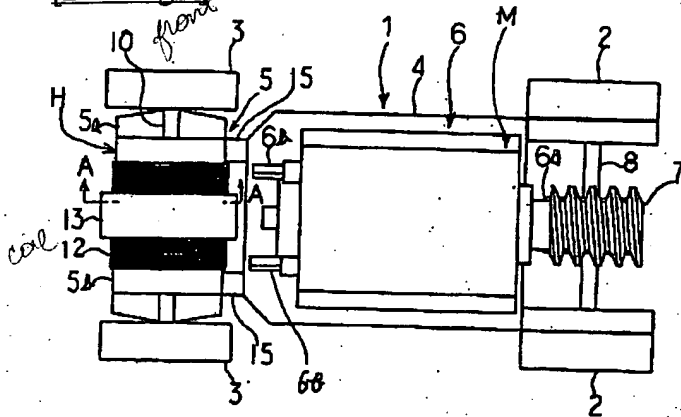
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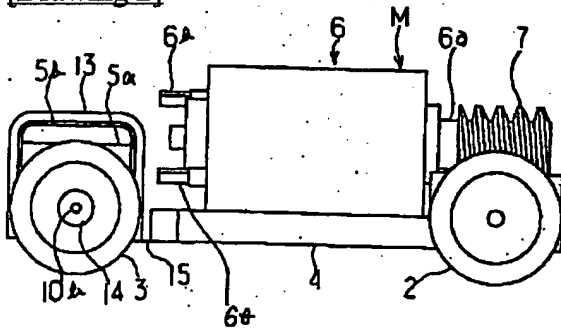
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## DRAWINGS

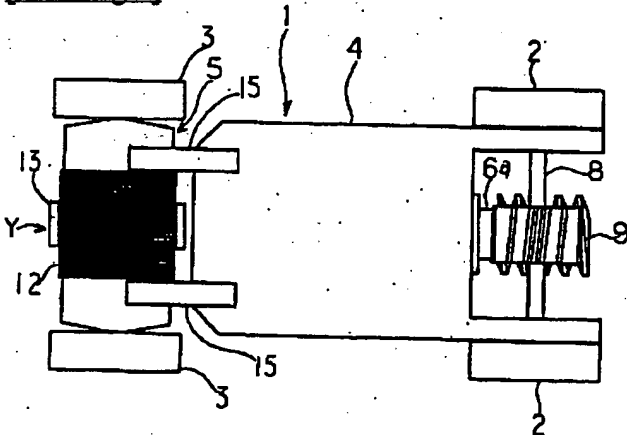
[Drawing 1]



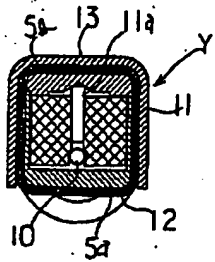
[Drawing 2]



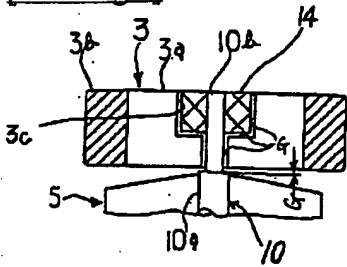
[Drawing 3]



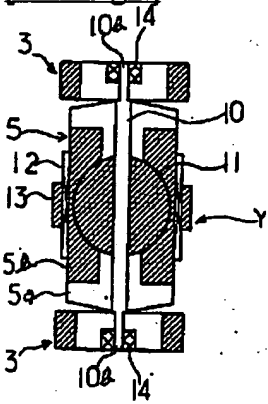
[Drawing 4]



[Drawing 5]



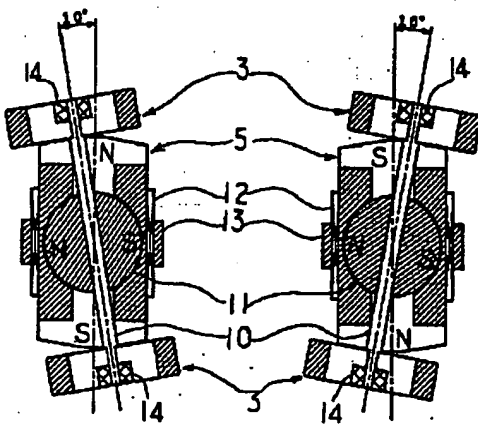
[Drawing 6]



[Drawing 7]

(a)

(b)



[Translation done.]